



U. S. Department of the Interior
Bureau of Land Management

Alaska State Office
222 W. 7th, #13
Anchorage, Alaska 99513

Developing a Global Climate Change Research Strategy for the Public Lands in Alaska

Richard F. Dworsky

HD
243
.A4
D96
1992

A speech presented at the American Water Resources Association Symposium
on Global Climate Change, Reno, Nevada, November 1992.

Developing a Global Climate Change Research Strategy for the Public Lands in Alaska

HD
243
AY
D96
1992

ABSTRACT. The Bureau of Land Management(BLM) manages more than 92 million acres of land in Alaska. More than 25 million acres are above the Arctic Circle. Prior to making a commitment to public land research and specifically research on global climate change, the Alaska State Director felt that an Alaska strategy should also fit the overall mission of the agency. Then it would be possible to identify the roles or niches where BLM Alaska could add to the current knowledge on global climate change. The following paper is a result of that process.

KEY TERMS: Alaska; Bureau of Land Management; global climate change; public lands; research strategy.

HISTORICAL PERSPECTIVE ON RESEARCH AND THE PUBLIC LANDS

The nation's public land and water resources are a crucial, finite resource that are used by everyone but cannot be exclusively owned by anyone. By custom, legislation, and court decree, the states and the federal government provide an institutional framework for the allocation of resources among competing users, and for public and private management of these resources. As demands on and problems involving land and water resources change with increased activities in various sectors of the economy, extensive information is needed about uses, benefits, costs, and trade-offs involved in any reallocation of land and water use, to ensure the promotion of the overall public welfare.

Beginning with the Lewis and Clark exploration of the Louisiana Purchase, continuing through Powell's Report on the Arid Lands, into the Roosevelt Era and the governors' conferences on natural resources and on through the present time, the federal government has grappled with the problem of managing natural resources. The federal government has enacted legislation and appropriated funds to attempt to solve a variety of land and water resource problems, beginning with data collection efforts and spreading to interrelated problems at the national, regional, state and local area levels. In recognition of the

3 3755 001 25140 4

national importance of the public land resources, Congress, in the Federal Land Policy and Management Act of 1976, declared that the nation's capabilities for public land planning and management must be strengthened at the national level, and that there should be a continuing national management investment in the public lands commensurate with growing national needs.

Today we realize that some public policies have been made in public lands management because of incorrect assessments of the cause and magnitude of problems; because of institutional limitations that unduly restrict the choice of solutions; because of incorrect projections of future economic, environmental, and social factors influencing these problems; or simply because research was not undertaken early enough to obtain sufficient information to solve problems.

Land problems are not static. Changes in many factors not directly related to land, for example, the rapid development of agricultural chemicals can create problems for which no ready solution exists. The sudden changes in the price of energy raise questions about energy extraction and pose challenges of designing energy efficient management. There clearly needs to be more economic and institutional research devoted to identifying future trends and alternative policies that might reduce unwise investments or decisions on the public lands.

If science and its accompanying technology continue to advance at an accelerating pace, any new land management effort should take account of scientific investigations in anticipating future needs and solutions, and should use technological capacity to forge new solutions. Yet, research has been the tool most conspicuously neglected in the whole kit of instruments used in managing BLM lands in the United States. This is ironic because it reflects a lack of faith in the science and scientific discovery which made possible the technology on which management had proceeded over the decades.

Stuart Chase, in *The Proper Study of Mankind*, speculates on the reasons for the enormous increase in knowledge which is the hallmark of our times. After advancing various possible explanations he suggests that, as each fact is verified of what is known, the potential number of combinations increases exponentially and that it is this accumulation of potential combinations that results in soaring increase in knowledge.

Research, as a management tool, would change the character of public lands management in several basic ways. Time or planning horizons would be shortened to take account of probable technological change. Measures having lower capital costs and higher operating cost over the shorter periods would be favored. Greater emphasis would be

placed on plans preserving flexibility to adjust to new techniques and social instruments as well as to shifting preferences. The range of practicable means would expand and with it the administrative complexity of manipulating multiple use of resources and lands.

ENVIRONMENTAL CHANGE

A consensus on the need to come to grips with a growing number of problems in the global environment has been evolving rapidly over the past few years among scientists, the public, and both public- and private-sector managers and decision managers. Driving this consensus is the realization that in the span of a single human generation, the Earth's life-sustaining environment and many of its component parts are expected to change more rapidly than during any other comparable period of human history. Much of this expected change will be of our own making. Increasing atmospheric concentrations of "greenhouse" gases may significantly alter our climate. Already agriculture, forestry and other land-use practices, industrial activities, as well as waste disposal, and transportation have altered terrestrial, ocean and aquatic ecosystems, thus affecting, for example, biological productivity, water and land resources, and overall environmental quality. These fundamental changes, transcend the traditional boundaries of scientific disciplines.

Contemporary advances in technology, such as the ability to observe the earth from space and the rapidly accelerating capabilities for data handling, numerical modeling, and telecommunications, make it possible to study large areas of land and even the entire globe. These capabilities, coupled with our growing understanding of the components of the Earth system—the atmosphere, oceans, soil and solid earth, and biota—and the physical, chemical, and biological processes that link them, permit an integrated interdisciplinary approach to research.

THE ROLE OF THE BUREAU OF LAND MANAGEMENT AND THE PUBLIC LANDS

BLM is a multiple-use agency, and it now has the opportunity to resolve or at least improve upon many of these concerns and issues. In order for the BLM to be recognized as a true multiple use agency, though, it will have to manage lands with a wide variety of uses and values for the public benefit. To accomplish this, BLM will need

greater public support. To understand the potentially expanded role of BLM it is necessary to recognize that:

- the public domain managed by BLM contains values and attributes that warrant its permanent public ownership and management for multiple uses;

- BLM as an agency is fully capable of managing the land in the broad public interest and;

- there is a fundamental benefit to management diversity in public land administration. The challenge is to accelerate and reinforce multiple-use management to provide the public with the full value of its lands, and to strengthen the agency as a steward and manager of these lands and resources.

We are entering an era when land management and habitat protection will replace species and population management as a top priority. This change in institutional and political perspective will require new insights about multiple-use values and their interrelationships to environmental change. Programs will have to be instituted to provide the needed knowledge and understanding, as well as to assure that technologically sound ecological principles are applied to the conservation of the nations' resources. At the same time that we need to understand more about the interrelationships of multiple uses, several Presidential initiatives are also directing the focus on how man and the biosphere interact. These efforts include "Global Warming," "Species Biodiversity," "Wetlands Protection," and other thrusts.

Within a multiple-use framework, research conducted by the Bureau of Land Management (BLM) and research by others on BLM-administered lands can serve an important role in determining whether or not change is occurring on the public lands, the amount and rate at which it is happening, and can implement ways where restoration and/or manipulation can lead to solutions for problems. Moreover, research can assist managers and the public in decisions relating to the allocation of resource values and opportunities. The Bureau's proper role in this work can best be identified in its mission statement.

MISSION STATEMENT OF THE BUREAU OF LAND MANAGEMENT

The Bureau of Land Management is responsible for the stewardship of our public lands. It is committed to manage, protect, and improve these lands in a manner to serve the needs of the American people for all times. Management is based on the principles of multiple use and sustained yield of our Nation's resources within a framework of environmental responsibility and scientific technology. These resources include recreation; rangelands; timber; minerals; watershed; fish and wildlife; air; and scenic, scientific, and cultural values.

Within this mission statement it is clear that the multiple use opportunities can be best managed through the Bureau's concept of stewardship.

MULTIPLE USE STEWARDSHIP OPPORTUNITIES

It has been said that the war for biodiversity will be won or lost on semi-natural landscape. BLM is in an ideal position to be the front line leaders in this war. Why? Because the BLM's mission and primary objective is to manage the public domain and its many resources under the concepts of multiple use and sustained yield to provide the maximum public benefit from these national resources. BLM's concept of stewardship emphasizes conservation and wise use of these resources, while achieving the optimum combination of balanced and diverse uses which also considers long-term needs of future generations.

The renewable resources of the Public Lands are managed to help meet the Nation's needs for domestic sources of food, fiber, timber, and wildlife on a sustained yield basis. The Public Lands also serve as a storehouse and/or for non-renewable resources such as oil, coal and mineral resources. These lands also provide for direct human use and enjoyment through recreational, ecological, historical, cultural, scientific, and other activities. Implied in the Bureau mission is the opportunity, even the requirement, to maintain and where possible to improve the basic ecology. This takes place through initiatives such as riparian, grazing, and habitat improvement for fish and wildlife, habitat modification such as controlled fires and environmental restoration of previously damaged lands. Within this mission, then, lies the opportunity for the Bureau of Land Management to take actions which may improve the response to increased use and pressure on the public lands.

To make this a reality we may need to see some differences in processes and working relationships, as well as implementation of actions called for in resource management plans. For example:

- landscapes need to be planned and managed to meet specific objectives for ecological conditions that yield desired economic and social goals. For the BLM this means an increase in the use of prescribed fire, a full range of silvicultural options, and a restoration of previously disturbed lands.

- entire regional ecosystems must become the areas where multiple use and multiple values are planned and scheduled, to conserve high quality biological areas as well as meet people's needs for resources.

On other lands, BLM should lead region-wide improvements in terms of landscape and habitat modification and restoration. Incentives, rather than mere regulation of private property and enterprises need to be developed not just to improve biodiversity, but also to respond to other concerns. For the BLM this means stronger plans and more cooperative planning and management. BLM has begun to undertake a program which focuses on the application of research to meet the mandates of legislation and the public desires and demands.

A key to these management actions lies in understanding. Understanding suggests a level of research effort within the BLM to assist in multidisciplinary and integrated natural resource decision making. The Bureau could do much more of what we are already legislated to do, but is presently understaffed and underfunded to respond to emerging issues and concerns. The following table suggests some of the potential options for implementing current stewardship themes set forth by this administration indicate that the Bureau already has in place programs for conducting integrated research, enhancing vegetation and implementing remediation strategies.

<u>TO MEET THE OBJECTIVE OF</u>	<u>IMPLEMENTING OPTIONS</u>
Riparian enhancement	Setbacks, habitat modification vegetation re-establishment
Wetlands loss/mitigation	Create wetlands in appropriate areas
Mining reclamation	Develop wetlands and improve streams, grass and brush reclamation
Range improvement	Improve habitat & restore
Forestry enhancement	Reforest, use fire, disease control, stand improvement
Creation of more recreation opportunities	Improve habitats, set aside lands for corridors reserves along which species can migrate in response to change
Fish and wildlife enhancement	Coordinate with wetland development, range improve- ments
Species protection	Improve habitat, protect plants and animals, and large scale restoration of the environment.

SPECIFIC FUNCTIONS WITHIN A RESEARCH PROGRAM

Because the Bureau of Land Management recognizes that research will contribute to the mission of the BLM and has a legitimate role in the execution of public land management, then a Bureauwide interdisciplinary forum for research activities could include:

- serving as a catalyst to promote communication and coordination among researchers from different disciplines and research organizations;
- organizing and conducting planning activities that bring scientists from different fields and institutions together to identify common interests and needs;
- facilitating the development of new research initiatives and related funding efforts;
- identifying the areas where additional staffing will be required to conduct research in an interdisciplinary manner;
- facilitating the development of a system to educate students on multidisciplinary Bureau programs, as well as creating opportunities for cooperative education students and interns;

- serving as a host to national and international scientists and managers active in interdisciplinary uses of lands;
- gathering, synthesizing, and disseminating relevant information for both the scientific and the decision-making communities; and
- developing public awareness of the needs, promise and opportunities of interdisciplinary earth studies.

The initial objectives of a research program are to:

- Improve the perception that Bureau employees are professional managers.
- Develop closer working relationships with other academic, public and private sectors.
- Develop a clearer understanding of the multiple attributes and functions of the public lands.
- Improve the capacity for technological assessment and planning.
- Improve the understanding of the interdependent properties of our environment and our society.
- Enhance the multidisciplinary nature of public lands management

Because of the opportunities presented to the Bureau in the above listings, it would appear prudent to develop a strategy or purpose which guides the research direction. This is called an overarching strategy.

OVERARCHING STRATEGY

One of the key components of designing a Bureauwide strategy is the establishing of an overarching goal for the Bureau. Such a goal serves to give coherence, excitement, and meaning to our work. An overarching goal can motivate, provide direction, and serve as a focus for change. In crafting an overarching goal we need to think about specific Bureau-wide problems but, moreover, seek ways to fit these specific problems into a general research program. The strategy that we use for specific problems can also be a focus for other related research efforts.

An overarching goal has several important effects. It builds a common frame of reference that allows people with different backgrounds and varying orientations to pull together collectively toward the same ends. it is an important force of change; it describes what could be, what the Bureau should strive for. Finally, it is highly

motivational. It puts individual tasks within a larger framework, thereby giving work greater significance.

Characteristics of an overarching goal:

1. It reflects a core purpose of the Bureau.
2. It is feasible.
3. It is challenging.
4. It has larger significance.

With this in mind one could propose an overarching R&D strategy which might look like the following;

The overarching strategy for the Bureau of Land Management research and development (R&D) program is to conduct interdisciplinary, and integrated multiple use research for the acquisition of scientific and engineering knowledge that responds to management needs for Bureau programs. The Bureau R&D program will address management questions relating to resource development, protection of the environment, and well being of the population by building a data base that emphasizes observation, understanding, cooperation, and coordination with other research and institutional entities that collect information and, lastly, cooperates with those who conduct basic research.

If one were to consider the Bureau strategy (developed above) as the structural statement in which the research program is to be conducted, then a secondary and even tertiary set of goals can be developed. The following program goals are examples for a global climate change program

BLM's strategy for Global Change issues is to observe and understand changes on Bureau lands that would result from climatic and other global change. Components of this strategy are:

•developing integrated data bases and models that focus on key/critical Bureau resources, programs, ecosystems, and management issues affected by global change;

•fostering cooperative R&D efforts with other agency (Federal, State, and local) endeavors particularly where we share boundaries and/or manage like resources.

A further breakdown of the strategy could occur. For example the Mitigation and Adaptation Research Strategy (for Global Climate Change) might say:

Given the knowledge gained about the effects of global change, BLM will establish the scientific, technological, and economic basis for efficient, cost-effective global change response policies and practices

to sustain environmental well-being. Such programs would improve the inter/multidisciplinary management of Bureau lands and programs.

Given such a research initiative how do the effects of climate change fit in?

To achieve a general appreciation of the impacts of possible global warming changes on the environment it is necessary to review the ways global climate change will manifest itself in terrestrial and aquatic environments. Terrestrial effects may be both direct and indirect on animal and plant species. The direct effects are fairly easy to predict. The indirect effects are more subtle. A one degree temperature change is equivalent to a 60- to 100-mile change in latitude. Thus many species of animals and plants will have to disperse in order to maintain their viability. There may also be cumulative and synergistic effects, but these are presently unpredictable.

Global warming would affect the composition of plant communities and, because of the slow migration rates of plant species, there would be a falling-off of the structure of the same communities. In part this is due to the speed of migration but also to the mineral properties of soils needed for nutrient supply and rates of soil development. This in turn is a complex function of a number of variables, and human influence could be an important factor as well.

The effect on animal populations would be somewhat different. This is because animal species might be able to quickly migrate vertically (in mountainous areas) or horizontally. The problem is that migration would stress new and/or existing habitats due to requirements on areas that are not as productive as previous ones. Additionally, global changes may impact many species of insects, birds, and mammals that are critical to the flowering and fruiting patterns of many plant species.

FOCUS ON ALASKA

Within the BLM Alaskan Arctic Research Strategy, several steps needed to be developed. The first was to lay out an overarching strategy or umbrella under which the Bureau of Land Management in Alaska (BLM-AK) could operate. The second was to develop some specific objectives for BLM-AK research that would both contribute to knowledge on global climate change and carry out BLM's mission. The third was to identify some of the more specific research topics that could be addressed through the Alaska initiative.

OVERARCHING STRATEGY FOR ALASKA

In crafting an overarching strategy we first had to think about Alaska's global climate change problems, but, also, seek ways to fit global climate change into a general Arctic research program for BLM-AK. In this way the strategy that we used for Arctic research could also be a focus for global climate change research efforts. In this regard, Alaska stands unique among all the Bureau offices because global climate change is expected to manifest itself first in the Arctic and subarctic environments. If this is so, then it was even more important for BLM-AK to design a overarching strategy so that research actions will be able to help managers make better natural-resource-management decisions in the long term. But, at the same time, an overarching strategy would focus Alaska research studies to support the national policy forum on research and specifically on global climate change issues.

Within the context of Alaska research a number of considerations and conclusions could be drawn:

1. Many of the environmental concerns in the Arctic deal with its unique aspects, such as permafrost, sea ice, a large-amplitude photocycle, and short, intensive growing seasons. Global climate change could aggravate the biodiversity of species in Arctic ecosystems, and the slowness of environmental recovery. Therefore the environmental consequences of erroneous predictions could be far more serious and long lasting than in temperate regions.

2. In the Alaskan Arctic (and the Arctic in general) there is a serious lack of long-term data concerning the physical and biological environment.

3. Much of the existing data are available only in proprietary reports and in the "gray" literature.

4. The cost of acquiring new data in the Arctic is much higher than in the other 48 states, and the process takes much longer because of shorter growing seasons.

In developing our strategy, we also needed to recognize that there are at least two separate and radically different, views of global climate change. The first that global climate change is a serious worldwide problem that may need draconian measures to solve. The second view that global climate change is an unobserved phenomenon predicted by models operating beyond their limits of credibility. This argument will have to be resolved—but not by BLM. The posture of the BLM would be to simply say that management of the nation's public land requires that the best information be made available so that the Bureau

mission of multiple use can be maintained and enhanced, with information from global climate change being considered with regard to environmental processes.

BLM could be involved in Arctic and global climate change research in various ways that would enhance our multiple use mission and support the overall national efforts on global climate change. The Alaska view of research in general and global climate change research specifically lies within three areas: 1) observation, 2) understanding, and 3) data management.

Observation

In a simplistic sense, the problems of Arctic research and global climate change impacts lie in the ability to observe change. Could we determine from what we observe that there is a change in the structure and/or function of our natural system? For BLM Alaska, this might mean research in determining biological and physical indicators such as plants, animals, soil temperatures and climatic conditions. Baseline studies are particularly important as a first step to understanding any phenomenon and its implications for other forms of resource use.

Understanding

If we observe change, could we understand enough to be able to do something about it? BLM AK could direct actions into revegetation, habitat modification, and landscape modification. More information on the basic values and expectations of diverse users is also necessary to determine actions required to ameliorate global climate change problems.

Data Management

Once data are collected on these different topics, how will they be used and disseminated? With numerous agencies involved in Arctic research as well as global climate change activities in Alaska, there will need to be an effort to unify data standards, storage, and manipulation, and to establish networks. In comprehending data then, it will be possible to evaluate proposed management actions for mitigation and controlling or reducing undesirable impacts.

Overall, the above parameters allowed for the formulation of a BLM Alaska strategy on Global climate change. This overarching strategy is the "what" this organization was seeking to establish. Therefore we wrote:

The Alaska Overarching strategy will be to conduct research generally in a format of research questions that allows BLM Alaska to collect information, to build a data base and to emphasize cooperation and coordination with other research and institutional entities that collect information and lastly, cooperate with those who do hypothesis testing.

Global-climate-change research is an element of initiatives from the President, the Secretary of the Interior and the BLM Director. Understanding, observation and data management of global climate issues integrate directly with policy and program thrusts such as Cooperation and Coordination, Recreation 2000, Fish and Wildlife 2000, Watchable Wildlife, America the Beautiful, Riparian and Wetland initiatives and other national direction. It is clear that there is a direct relationship between global climate change and the quality of decisions made for managing the public land. The categories of research identified below represent some of the elements that will support and assist in global climate change research, National program thrusts and improving management decisions on the Bureau land.

Within this overarching strategy several categories of research stand out. These are not the only types or categories that could be identified, but these do suggest a framework. The following pages identify the "What" of the BLM-AK strategy; the "How" will be developed as outlined by the Washington office instructions.

CATEGORIES OF RESEARCH

There are at least three topical areas of research for BLM Alaska to emphasize—there could be more. These include:

1. Atmospheric, Hydrologic, and Hydraulic Processes.
This category research on the physical processes involved in climate change such as water movement, physical processes and atmospheric and meteorological processes. These forces ultimately influence water use and instream and offstream uses.
2. Ecological-Environmental Relationships and Biological Diversity.
This category includes research on the effects of human use, modification, and management of the environmental and of biological resources.

3. Institutional Analysis.

This category includes research and coordination is needed on how to manage BLM programs in cooperation with other researchers.

Within these three broad areas, some more specific actions stand out. Following is a suggested format which could accommodate a variety of research proposals.

Questions to be answered

Objective of Study- Defines the general focus of what is to be accomplished.

Leadership of Project- Identifies the key contact point within BLM.

Cooperating Agencies- Identifies those who would have a research interest in this project.

Expected Results- Builds the case for more research on BLM lands leading to better management and agency credibility.

Support of Ongoing Programs- Build operational means whereby research could and should be done on BLM lands. Provide funding in-house only for that research truly meeting global climate change after internal/external peer review. Establish cooperative research units for BLM or Interior in Alaska to fund research with global climate change and BLM objectives.

Global Change Research Priority- In meeting the global climate change objectives the focus will have to be on cooperation, sharing data and partnerships with long range goals and hold more importance than meeting short term objectives.

Methodology- Identify specific actions to be taken.

PRELIMINARY SUGGESTIONS FOR RESEARCH

Within Atmospheric, Hydrologic, and Hydraulic Processes the following might be suggested:

Establishment of Water Sampling Stations-

Objective of Study-Develop significant baseline data on water quality and quantity. Observe any changes that occur over time. Any improvement in the ability to predict hydrologic events would benefit our understanding of overall water quality and quantity that may be impacted by global climate change.

Leadership of Project- Districts

Cooperating Agencies- USGS, State of Alaska

Expected Results- Greater understanding of short term change and composition of water resources, establishment of needed stations to strengthen ongoing programs and improve baseline data

Support of Ongoing Programs- Includes water rights adjudication, instream flow characteristics for fish and wildlife management and nature of proposed and/or actual development such as placer mining and understanding of riparian habitat

Global Change Research Priority- Climate and hydrologic systems, Ecological Systems and Dynamics

Methodology-. Establish water sampling stations at 15 sites(to be determined)

Identify changes in air quality by using Remote Area Weather Stations(RAWS)

Objective of Study- To learn more about weather patterns and atmospheric chemistry in remote areas of Alaska. Climate change, whether induced naturally or technologically may have profound effects on agriculture and industry and hence on the nation's socioeconomic structure

Leadership of Project- Alaska Fire Service

Cooperating Agencies- All federal agencies conducting climate research, especially Interior agencies, BLM Districts

Expected Results- A greater understanding and data base for climate conditions within Northern Alaska, and the interrelationship between climate and water resources

Support of Ongoing Programs-Will aid current fire fuels and fire climate programs and improve general background data for resource management

Global Change Research Priority- Climate and hydrologic systems, Ecological Systems and Dynamics

Methodology- Establish remote area weather stations at specific areas(to be determined)

Fluvial Mechanics

Objective of Study-To understand the relationship of fluvial mechanics to habitat development and restoration. The products of erosion and nutrient transport need to be understood as a function of climatic change

Leadership of Project- Districts

Cooperating Agencies- USFWS, USGS, COE and University.

Expected Results- Identification of processes and procedures to help manage BLM land

Support of Ongoing Programs- This includes wetland, mining mitigation (3809), fish and wildlife, riparian habitat and recreation

Global Change Research Priority- Climate and hydrologic systems, Ecological Systems and Dynamics, and Biogeochemical dynamics

Methodology- Specific research actions associated with water sampling stations.

Within Ecological Environmental Relationships and Biological Diversity some suggestion are:

A Review of Human Use in the Arctic and potential relationships to changes in the Global System

Objective of Study- To determine if human use of the Arctic has been impacted by changes in the global system. Additionally, review and evaluate prior studies and environmental documentation to see if any kind of baseline activity could be discovered

Leadership of Project - Districts and State office.

Cooperating Agencies - Interested Federal and State agencies

Expected Results- Learn the quality of environmental documentation

Support of Ongoing Programs- Will support ongoing biophysical and geological programs

Global Change Research Priority- Climate and hydrologic systems, Ecological Systems and Dynamics, Biogeochemical dynamics, Human interactions

Methodology- Re-evaluation of Arctic developments through human change by checking past EA documents

An Environmental Baseline Study or EKG

Objective of Study- To gather all (sic. as much as possible) biological, physical and environmental data and information in specific sites as well as on the ACEC and RNA that have been identified in our Resource Management Plans

Leadership of Project- SO leadership in conjunction with Districts. and AFS and RAWS network

Cooperating Agencies- Other Federal, State and University researchers

Expected Results- This will tell us what exists on each site as of 1992 and could be used as a baseline for further studies and monitoring

Support of Ongoing Programs- Consistent with the outputs of the four Resource Management Plans and future planning efforts

Global Change Research Priority- Climate and hydrologic systems, Ecological Systems and Dynamics

Methodology- Develop an intense, site specific sample process

What Role Does Fire Play in the Northern Climate Air Quality

Objective of Study- Compare and evaluate fire management plans with actual effects of fire. Gather data on historical occurrences of fire, locations, kinds of fuels etc.

Leadership of Project- AFS

Cooperating Agencies- BIFC, Districts, State, USFS, NPS, USFWS

Expected Results- Basic information on the extent and location and a better understanding of fire effects in northern airsheds. Could result in a change of policy in fighting fire in Alaska

Support of Ongoing Programs- Consistent with evaluating fire plans and could support increased revegetation planning

Global Change Research Priority- Climate and hydrologic systems, Ecological Systems and Dynamics

Methodology- Information developed by using GIS

Restoration and Revegetation Research

Objective of Study- Identify new opportunities for re-establishment and/or modification of vegetation in Alaska

Leadership of Project- SO and Districts

Cooperating Agencies- USDA, SCS, Universities, State

Expected Results- Development of species that will increase the vegetation and/ or re-establish on critical areas

Support of Ongoing Programs- Will support riparian, wetland, forestry, range and other resource based programs. Will support 3809, mining reclamation and channel restoration

Global Change Research Priority- Climate and hydrologic systems, Ecological Systems and Dynamics

Methodology- Develop experimental opportunities for vegetation research

Subsistence Management and Global Warming

Objective of Study- Identify the relationships between species used in subsistence and potential habitat modification related to global climate change

Leadership of Project- SO and Districts

Cooperating Agencies- NPS, F&WS, State

Expected Results- Identify the impacts to subsistence on Federal Land as a result of climate induced habitat modification

Support of Ongoing Programs- This will support wildlife 2000 efforts and subsistence management

Global Change Research Priority- Human interactions. Ecological Systems and Dynamics

Methodology- Use inventory and GIS to develop roles and uses

Within Institutional Analysis the following topics might be suggested:

Institutional Coordination

Objective of Study- Develop policy and procedures that will support a coordinated USDI approach to global climate change.

Leadership of Project- BLM.

Cooperating Agencies- USDI agencies and others.

Expected Results- Improved coordination between and among programs.

Support of Ongoing Programs- Will ensure coordination and fiscal responsibility and support joint planning efforts. This study will be useful to the National Science Foundation and Man and the Biosphere program.

Global Change Research Priority- Climate and hydrologic systems, Ecological Systems and Dynamics, Human interactions.

Methodology- Use existing cooperative agreements

Data Management

Objective of Study- Use BLM computer data resource systems to collect Global Research data.

Leadership of Project -BLM.

Cooperating Agencies -USDI agencies and others.

Expected Results- Build a global data base for Alaska.
Support of Ongoing Programs- Support existing resource data based programs.
Global Change Research Priority- Climate and hydrologic systems, Ecological Systems and Dynamics, Human interactions.
Methodology- Develop along with ALMRS program

Historic Climate Change Coordination

Objective of Study- Discover if climate changes are within normal climatological occurrences. Studies include Permafrost measurements in wells drilled in the Arctic, lake core pollen samples, glacier samples for pollen, tree line studies and temperature analysis in wells, as well as other dendroclimatological studies on Arctic taiga and treelines.
Leadership of Projects- Various- USGS, NPS, USDI, Universities.
Cooperating Agencies- BLM AK and other USDI.
Expected Results- Build a global data base for Alaska.
Support of Ongoing Programs- Will support existing resource data based programs.
Global Change Research Priority- Climate and hydrologic systems, Ecological Systems and Dynamics, Human interactions.
Methodology- Support and coordinate with existing research agencies

Information Transfer

Objectives- Develop a system within the office of public affairs to assist in the distribution and dissemination of information developed as a result of the above studies. Improve public outreach.
Leadership of Projects- Public affairs and research leaders.
Cooperating Organizations- USDI libraries.
Expected Results- Improved information transfer
Global Change Research Priority- Information and education, Data management
Methodology- Use existing organizations

IMPLEMENTATION

With this model, broad outlines can be established to guide BLM Alaska's Arctic and global climate change research. Depending on the calls for proposals, specifics of funding, cooperation and coordination and prospectus development can be accomplished.

This model also seems to suggest that a high degree of utilization of research planning will help overcome some of the problems of budgetary constraints and perceived importance. A research planning approach will help:

1. Guide research to the highest priority needs,
2. Avoid duplication of efforts,
3. Coordinate research findings and to build on interim research results,
4. Assure recognition of emerging problems,
5. Provide advance information for adjusting research capability to research needs.

This model also suggests that a program should be developed with adequate staffing and funding to carry out an Arctic research and global climate change initiative. In this effort BLM-AK can be a major player

REFERENCES

Arctic Research Commission. 1991. *Goals, Objectives and Priorities to Guide United States Arctic Research*. U.S. Arctic Research Commission, Washington D.C., 39pp.

BLM Global Change Research Workshop. 1991. Unpublished papers.

Committee on Earth and Environmental Science. 1992. *Our Changing Planet: The FY 1992 U.S. Global Change Research Program*. c/o U.S.G.S. Reston, 84pp.

Dworsky, R.F. 1991. *BLM-Alaska Global Climate Change Research Proposals*. Bureau of Land Management, Anchorage, 347pp.

Interagency Arctic Research Policy Committee. 1990. *Arctic Research of the United States*. National Science Foundation, Washington D. C., 105pp.

Lindzen, R.S. 1990. A Skeptic Speaks Out. *EPA Journal* Vol. 16, Number 2, pp 46-47

Sproull, N.L. 1988. *Handbook of Research Methods: A Guide for Practitioners and Students in the Social Sciences*. The Scarecrow Press, Inc. Metuchen, N.J., & London, 404pp.

Definitions (Authors)

•**Research.** The process of formulating and testing a hypothesis that might explain or lead to knowledge, understanding, or solution of unresolved questions or problems

•**Basic Research.** Research for the purpose of increasing knowledge or understanding of a subject without any specified use that might be made of the result.

•**Applied Research.** Research for the purpose of increasing knowledge or understanding of a subject in ways that will have practical application to a specific problem.

•**Land and/or Water research.** Basic or applied research dealing with the quality of land/water; the relationships between land/water and ecology; land/water management; and the political, legal, behavioral, economic, and other institutional aspects of the use of land/water.

•**Demonstration.** Actual construction and operation or use for the purpose of showing that a process or technology can be put to practical use.

•**Technology Transfer.** Facilitation of the widespread use of the results of research, development, and demonstration.